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Small Farms Research News

USDA, ARS, SPA

Spring 2001 2nd Edition

Current Livestock Research

Taste Panel Finds Lamb as Acceptable as Beef

A glance in the meat section of any grocery store in the U.S. will tell you that Americans eat more beef than lamb. Does this mean that Americans do not like the taste of lamb?

At the mini-field day held at the Center last October, participants compared the taste and tenderness of a lamb product to that of beef filet mignon in a non-scientific taste test. The lamb was derived from Dorper x St. Croix or St. Croix wether lambs that were grown at the Center as part of a growth and carcass evaluation study in summer and fall of 2000. The lamb mignon had an appearance of beef filet mignon. The lamb product was made by processing the entire carcass and then wrapped with bacon. The lamb mignon was developed by Dr. Jason Apple at the Department of Animal Science, University of Arkansas in Fayetteville. The meat was cooked on a gas grill and served as Sample A or B. If lamb is not cooked properly, where the fat drains away from the meat, an off-flavor and odor may be present.

Members of the survey rated the meat products for appearance, initial tenderness (first 5 bites), initial juiciness (first 5 bites), sustained juiciness and tenderness (just before swallowing), overall flavor, overall desirability, and whether they would purchase the product (Table 1). Consumers rated both products similarly in all categories except tenderness. The lamb meat was more tender than the beef. Considering that many of the taste panel members were cattlemen this suggests that lamb is just as acceptable as beef!

Table 1. Taste and Tenderness of lamb filet as compared with beef filet mignon as judged by unofficial taste test pane of field day participants. Ratings scale from -5 (dislike) to 5 (liked very much).

Attribute	Beef	Lamb	Preference for lamb
Appearance	2.9	2.8	-0.06
Initial tenderness	2.4	3.2*	0.82
Initial juiciness	2.4	2.9	0.47
Sustained juiciness	2.5	2.6	0.08
Overall flavor	2.7	2.6	-0.11
Overall desirability	2.7	2.3	-0.44
Purchase potential	3.1	3.0	-0.12
Total	18.7	19.4	0.65

*Statistically greater preference for lamb tenderness.

For additional information contact Joan Burke at DBSFRC. *

Evaluation of Hair Breeds of Sheep for Low Input Management

The sheep industry is in a transitional phase because of the loss of the wool commodity program, and now is turning to lamb as its main commodity. In addition, sheep producers, novel and experienced, are looking for easy care, low maintenance breeds of sheep. Hair sheep appear to fit the mold because they never need shearing, possess some degree of parasite and disease resistance, and are adaptable to different environments. On the down side, hair sheep tend to produce smaller, slower growing lambs than traditional wool breeds.

Researchers at the Center are examining productivity of a relatively new breed of hair sheep in this country, the Dorper. The Dorper breed may add some size and carcass acceptability when used in a crossbreeding program with other hair sheep breeds. Major hair breeds in our country include Katahdin, St. Croix, and the Barbados Blackbelly. The Katahdin was developed in Maine in the 1950s from hair sheep from the Carribean crossed with a variety of wool sheep, including Suffolk and Wiltshire Horn. Weight of mature ewes range from 120 to 160 pounds. The St. Croix breed was imported to the mainland U.S. from the Virgin Islands in 1960 (mature ewes: 125 to 150 pounds) and Barbados Blackbelly was imported from the Carribean in 1904 and range in weight from 70 to 130 pounds. Range in weight of Dorper ewes is between 170 and 200 pounds. These weight ranges are from American Sheep Industry Association, Englewood, CO. Weight ranges in the southeast may be lower perhaps because of the heat stress and lower feed quality compared with cooler climates in the U.S.

A study was completed last fall that evaluated growth and carcass characteristics of St. Croix and Dorper x St. Croix wethers for 120 days after lambs were weaned. Lambs were raised intensively in a feedlot type system. Dorper x St. Croix lambs had the highest average daily gain, heaviest carcasses, and largest longissimus muscle area (which means larger lamb chops). Using the Dorper as a terminal sire in a St. Croix flock appears to be an acceptable means to produce larger, faster growing lambs.

At this time, more work needs to be done before management recommendations can be made for hair sheep. One potential strategy for producing market lambs from hair sheep is to breed a larger wool-type ram to hair-type ewes for terminal lambs. A hair breed sire would be needed to generate replacement ewes. This way, only the ram would require shearing. In addition, there are ethnic markets that desire smaller frame lambs, which provides an outlet for the hair breed wether lambs.

Another aspect of hair sheep management being studied is parasite control. Breeds are being evaluated for their tolerance to internal parasites. The infection from parasites can markedly impact the performance of an animal because of the detrimental effects on health (anemia, edema, diarrhea, etc.). Parasites have become resistant to dewormers that are currently available. New anthelmintics are far-off in the future. Sheep that can

carry intestinal parasites without affecting performance would be an asset to any operation. In this study, fecal egg counts will be determined for individuals from each breed flock to assess internal parasite resistance on mature ewes and weaned lambs. Preliminary data suggest that the Dorper possesses at least some degree of parasite resistance as compared with St. Croix and Katahdin breeds.

Producers also are interested in raising hair sheep without any supplemental feeds for production of grass fed lambs. There is an appeal for improved fatty acid composition of the meat using this strategy. Researchers have observed an increase in conjugated linoleic acid, a fatty acid that is more healthful than other fatty acids found in meat, in grass fed livestock compared with those fed concentrates. Other minimal inputs desired include limited deworming and pasture lambing (vs pen lambing in a barn). The Center's livestock project is examining some of these management strategies to maximize production of easy care sheep.

For additional information contact Joan Burke at DBSFRC. *

Can Beef Cows Be Managed Effectively to Avoid Problems With Reproductive Performance When Grazing Infected Tall Fescue?

Tall fescue toxicosis, a collection of disorders that occur when cattle graze endophyte-infected tall fescue, reduces the productivity of the American cattle industry by more than 600 million dollars annually. Endophyte-infected tall fescue produces toxins that cause the disorder. Approximately half of this economic loss attributed to fescue toxicosis is believed to be due to reduced reproductive performance, including decreased pregnancy and calving rates, and delayed conception. Beef heifers and cows are typically bred during late spring and early summer months, often on fescue-based pastures in the southeastern and Midwestern United States at times when heat stress may occur. Heat stress tends to reduce conception and calving rates. The inability to regulate body temperature, triggered by fescue toxicosis, may further exacerbate the effects of heat stress on conception.

A cooperative study took place at the University of Missouri that considered what happens to heat stressed beef heifers consuming infected tall fescue. This study focused on the effects of heat stress and infected fescue on ovary functions and hormones involved in reproduction. The ovary plays a large role in reproduction. The ovary produces progesterone, a hormone required for pregnancy. Another hormone important for reproduction is estradiol produced by the follicles on the ovary. These follicles house the eggs that potentially will become a calf. In this study, heifers were fed either a diet containing endophyte-free or infected tall fescue and were exposed to heat stress (88°F) or non-heat stress temperature conditions (66°F). Amount of feed offered was the same. Consumption of infected fescue impaired ovarian function when heat stress was imposed and to a lesser degree in the absence of heat stress. Development of follicles and production of estradiol was impaired in the heat stressed heifers consuming the infected fescue seed.

The extent that heifers experienced signs of fescue toxicosis when fed infected fescue under non-heat stress temperatures was less than the heat stressed heifers. This may explain why some researchers observe decreased pregnancy or calving rates when cattle graze infected fescue and some observe no differences compared with non-infected grasses. This strongly suggests that optimal conditions to breed heifers grazing endophyte-infected fescue pastures would be in the absence of heat stress.

Another study that was conducted here in Booneville examined embryonic losses in mature beef cows grazing endophyte-free or infected tall fescue between April and October 1999. Cows were synchronized for estrus and bred by AI in early June. While signs of fescue toxicosis existed in cows grazing infected fescue (increased rectal temperature and respiration rate, decreased prolactin), there were no differences in reproductive responses between pasture treatments (Table 1). There was an increase in embryo losses by the time the cows were weaned in those grazing infected fescue, which occurred during heat stress, but this was not a significant increase.

“..... optimal conditions to breed heifers grazing endophyte-infected fescue pastures would be in the absence of heat stress.”

Table 1. Reproductive responses between cows on endophyte-free (E-) or infected (E+) tall fescue pastures. Values represent least squares mean adjusted for treatment and breed effects.

	Pasture treatment	
	E-	E+
Pregnancy rate at weaning ^a , %	89.7	84.8
Calving rate, %	85.1	85.0
Embryo loss, %	5.5	17.6

^aPregnancy length at weaning was between 70 and 126 d.

Over many years, research at the Center has demonstrated that under good management conditions (animals and forage), pregnancy rates and calves can be quite high for cows grazing endophyte-infected fescue. Further studies that focus on defining management conditions for ruminants grazing endophyte-infected tall fescue that yield acceptable pregnancy rates are necessary. Maintaining cows in good body condition just prior to and during the breeding season is recommended for high pregnancy rates.

As many cattlemen know from advertisements in many magazines recently, a new tall fescue variety that contains a novel endophyte has been developed and is being sold. This new tall fescue is being sold under the trade name MaxQ (Pennington Seed, Inc., Madison, GA[†]). This endophyte is supposed to be non-toxic to cattle. This past fall a 40 acre field was planted to MaxQ tall fescue. This field will be used to evaluate cow-calf performance on MaxQ for the next 5 to 10 years. Typically, without the endophyte, the tall fescue plant is subject to more stress and is less persistent than the infected fescue. However, the friendly endophyte in the MaxQ, is supposed to give the plant protection from environmental stresses, yet does not contain the toxins found in other varieties of infected tall fescue. Researchers from University of Georgia reported increased growth rates in weaned cattle grazing the MaxQ for 12 weeks compared with infected tall fescue (Kentucky 31). However, there is little data on performance of a cow-calf herd on MaxQ. The study being conducted at the Center is quite unique since it is one of the few tests comparing cow-calf performance on MaxQ to endophyte-infected and endophyte-free tall fescue. By fall of 2001 we will have pregnant cows grazing the new fescue variety and these cows will calve

and breed on this pasture in 2002. It will take a number of years before recommendations can be made for beef cows grazing the MaxQ tall fescue.

One of our cooperators, Dr. Chuck West of the University of Arkansas, will be examining the persistence of novel endophyte fescue varieties developed in his laboratory in combination with bermudagrass for drought tolerance and competitiveness. In addition, steers grazing one of these non-toxic fescue varieties gained as well as those grazing endophyte-free tall fescue and there were no signs of fescue toxicosis. Seed from these non-toxic fescue varieties should be available for farmers in two or three years.

Tall fescue toxicosis research at Oregon State University (Dr. Morrie Craig), explores detoxification of the infected tall fescue by rumen microbes. About fifteen years ago, they began studies on a toxic plant called tansy ragwort, well known in the wetter western climates of northern California, Oregon and Washington. Alkaloids from tansy ragwort cause liver cirrhosis in cattle and horses. This has been documented for over 100 years. It was discovered back in the 1950s that sheep were resistant to these toxins, while cattle and horses were not. There was indirect evidence that led scientists to believe that the livers were different between sheep and cattle/horses. However, in experiments toxins were infused directly into the livers of sheep and cattle, producing cirrhosis of the liver in both species. At that point, researchers made a change in the hypothesis. The upshot of the findings on tansy was that microbes from sheep were found to degrade the toxic alkaloids into a nontoxic product. This discovery has led OSU to look at other toxic plant problems, such as endophyte toxins produced by tall fescue and perennial ryegrass. More recently, a delivery system is being developed to protect the animal microbe from oxygen. This will allow ruminal microbes to be added to feed. The discovery of biodegradation of plant toxins produced a new paradigm in veterinary medicine. When ruminants consume toxic plants, the toxins diffuse out of the plant and towards the rumen wall. If there is a sufficient amount of "the right" bacteria, the toxic molecules will be degraded in a timely manner. Thus the susceptible species of herbivore will be protected from clinical disease. What this means is that in the future we may be able to feed microbes to cattle that will enable them to graze infected tall fescue with little signs of fescue toxicosis.

In summary, scientists are developing management options and perhaps new products for cattle grazing endophyte-infected tall fescue. In addition, non-toxic endophyte-infected tall fescue varieties are being evaluated for profitable cattle production.

*For additional information contact Joan Burke at DBSFRC, Dr. Charles P. West, University of Arkansas, or Dr. A. Morrie Craig, Oregon State University. **

University of Missouri Researches the Problems of Fescue Toxicosis to Reduce Severity in Cattle

A large portion of the tall fescue grown in the United States is infected with a fungus (*Neotyphodium coenophialum*) that improves drought and heat resistance of the fescue, but results in numerous animal-related problems that are collectively known as fescue toxicosis or summer slump. These problems ultimately reduce health status and overall level of production. The primary symptom is an increase in internal body temperature, sometimes characterized incorrectly as fever, that is the result of a reduced ability to combat summer heat stress. Associated problems that are attributed to the increased body temperature include reductions in feed intake, growth rate, milk yield, and reproductive success.

As of today, there are no known effective and efficient treatments for fescue toxicosis. The best suggestion is to avoid intake of infected fescue during summer months. This suggestion applies especially to consumption of fescue seed heads, which are known to concentrate the toxins responsible for fescue toxicosis. In order to accomplish this, it is recommended to graze pastures at a level which does not allow for the formation of seed heads.

Studies in our laboratory at the University of Missouri have concentrated on the increase in body temperature that is characteristic of fescue toxicosis. These studies include: 1) determination of causes for the increase in body temperature - 2) evaluation of potential treatments that are available now or will be in the future - and 3) identification of animals that are sensitive to fescue toxicosis. The primary cause for the increase in body temperature is a reduction in blood and heat flow to the skin. Increase in heat loss from the skin using ponds

for cooling, shade, fans/sprays, or even nighttime cooling will reduce the increase in internal body temperature associated with fescue toxicosis. In addition, exposure to summer heat for 3-4 weeks prior to placement on infected pasture allows for partial adaptation to heat stress and reduces the magnitude of the rise in internal temperature of most cattle.

Several compounds have been tested in the laboratory to determine effectiveness in reducing symptoms associated with fescue toxicosis. Cattle receiving Ivermectin (IVOMEC SR Bolus[®]) and infected fescue during heat stress appeared to have a lower internal temperature and higher daily feed intake than cattle receiving a placebo. In a second laboratory study, cattle receiving a diet of infected fescue and 1% seaweed extract (*Ascophyllum nodosum*) had a lower internal temperature than control animals during heat stress. Both compounds are undergoing further testing. At present, it is unknown if the benefit seen in the laboratory will carryover to the field situation. In addition, it is unknown if these compounds are affecting the response to heat stress alone or the combination of heat stress and infected fescue.

The third area of study evaluates the possibility of identifying animal sensitivity to infected fescue and summer heat stress. We have determined that cattle maintained on infected fescue during a typical Missouri summer can be separated into sensitive and insensitive animals based on average daily gain. Cattle with the lowest average daily gain have higher internal temperatures during the summer. Further testing of these animals in the laboratory show that the primary sensitivity difference is to heat stress and not the combination of heat stress and fescue toxicosis. It may be possible in the future to select out sensitive animals from the population, based on blood or urine markers which have yet to be determined.

Previous studies have concentrated on body temperature of cattle, since the increase in body temperature during fescue toxicosis is one of the most reliable markers of this condition. We have begun studies with other researchers in Animal Sciences and the College of Veterinary Medicine at the University of Missouri to address more long-term, and potentially more significant, problems associated with fescue toxicosis. These studies will concentrate on the general health of the animal, as impacted by fescue toxicosis. These areas include effects on digestion that may reduce growth,

immune function that might decrease disease resistance, and liver activity that affects breakdown of potentially harmful by-products. Future research into cures for fescue toxicosis must adopt a multidisciplinary approach in order to solve this complex agricultural problem.

“Cattle receiving Ivermectin (IVOMEC SR Bolus[®]) and infected fescue during heat stress appears to have a lower internal temperature and higher daily feed intake.....”

For additional information contact Donald Spiers at the University of Missouri-Columbia. *

For every minute you're angry, you lose sixty seconds of happiness. *

People aren't difficult, they are different. *

Bermudagrass Variety Trial

A multi-year field trial was initiated in 2000 at the DBSFRC, Booneville, AR to determine the performance of 12 bermudagrasses. The objectives are as follows: (1) compare sod development during the year of planting; (2) determine dry matter and crude protein; (3) evaluate persistency; and (4) identify cultivars as potential alternatives or replacements for existing bermuda's.

This year will be the first for measuring all twelve cultivars. As table 1 indicates, only nine entries were advanced enough to be cut and weighed in August and September of 2000. Soil fertility is maintained at the University of Arkansas recommended medium fertility level per soil tests. For dry matter yield determination, each plot was cut to the 2 ½ inch height with a rotary mower and bagged, dumped onto a canvas, weighed, and sampled for moisture determination. If plans materialize, 12 bermuda cuttings will be evaluated during the next 5 years, being fertilized and managed to simulate a hay management program. Data collected during this investigation should be interesting, revealing and perhaps point to a hybrid or hybrids that should be considered by area farmers.

“Soil fertility is maintained at the University of Arkansas recommended medium fertility level”

Table 1. Dry Forage Yields from Bermudagrass - 2000 Booneville, Arkansas			
Pounds/Acre			
Variety or Strain	Clipping Dates		2000 Total
	08/08	09/07	
Jiggs	2902.33	912.68	3815.01
Tifton 44	2610.27	1149.98	3760.25
Midland 99	2393.05	1259.50	3652.55
Russell	2895.69	657.13	3552.82
Whitney	2062.66	879.49	2942.15
Common	2292.66	474.60	2767.26
Midland	1551.56	456.34	2044.41
OK Wonder	817.76	456.34	1274.10
Quickstand	808.64	346.82	1155.46
Tifton 85			
CD 90160			
LCB 84x19			

For additional information contact Jim Miesner at DBSFRC. *

Dale Bumpers Small Farms Research Center is a partnership among three institutions:

ARS- conducts research related to livestock production and agroforestry; ARS staff can be reached at 501-675-3834.

PMC/NRCS- evaluation of vegetation and vegetation technology to retain soil and its productive capability; NRCS staff can be reached at 501-675-5182.

Division of Agriculture/University of Arkansas- dissemination of agricultural information. Extension Specialist, Billy Moore, can be reached at 501-675-5585. *

It takes less time to do a thing right than it does to explain why you did it wrong.

Henry Wadsworth Longfellow *

ARS Scientists at DBSFRC and their primary research focus

David Brauer- Agronomist/Research Leader investigating both agroforestry and livestock production

Glen Aiken- Agronomist investigating production practices for stockers

Adrian Ares-Forester working on tree growth and physiology in agroforestry systems

David Burner- Agronomist investigating agricultural production in agroforestry systems

Joan Burke- Animal Scientist investigating reproductive performance in cattle and production practices for hair sheep

Dan Pote- Soil Scientist investigating the effects of management practices on sediment and nutrient retention in agroforestry and livestock production systems *

Organizations promoting agriculture in the Ozark Region

The information below is not an exhaustive list of organizations trying to help farmers and ranchers in the Ozarks. If your organization is interested in being included, please contact David Brauer.

Poultry Production and Product Safety Research Unit (PPPSRU)/ARS/USDA/Center of Excellence for Poultry Science is located on the campus of the University of Arkansas in Fayetteville. PPPSRU conducts research to solve problems related to: 1) diseases and physiological disorders that are of economic importance to the poultry industry; and 2) land application of waste from the poultry production. PPPSRU can be reached by phone at 501-575-4202 or on the world wide web at www.uark.edu/~usdaars/.

South Central Agricultural Research laboratory (SCARL)/ARS/USDA conducts multi-disciplinary research for developing technologies to establish and sustain production and post harvest quality of alternative crops such as vegetables, small fruits and kenaf. The Laboratory is co-located with the Oklahoma State University's Wes Watkins Research and Extension Center

in Lane, OK. SCARL can be reached by phone at 580-889-7395 or on the world wide web at www.lane-ag.org.

Shirley Community Development Corporation (SCDC) is a community-based organization formed to plan and initiate short and long-term development programs for Shirley, AR. and the surrounding communities. These programs focus on economic development, educational enhancement, youth job training and service projects that improve and strengthen the community. SCDC is involved in projects that research and demonstrate the skills and techniques needed for production and marketing of specialty, agricultural crops. The present focus is on log-grown Shiitake mushrooms. SCDC operates the Shiitake Mushroom Center as a training center. Recent additions to our activities include on-site production of garden bricks and stepping stones, raised bed herbal plots, twin wall polycarbonate greenhouse, and compost demonstration project. SCDC can be reached by phone at (501) 723-4443 or on the web at <http://www.shiitakecenter.com/index.html>.

The Kerr Center for Sustainable Agriculture in Poteau, OK offers leadership and educational programs to those interested in making farming and ranching environmentally friendly, socially equitable, and economically viable. The Kerr Center can be reached by phone at 918-647-9123, by email at mailbox@kerrcenter.com or on the web at www.kerrcenter.com.

ATTRA, Appropriate Technology Transfer for Rural Areas, is the national sustainable agriculture information center. ATTRA provides technical assistance to farmers, Extension agents, market gardeners, agricultural researchers, and other ag professionals. ATTRA is located in Fayetteville, AR. ATTRA staff members prefer to receive request for information via 800-346-9140. ATTRA maintains a web site at www.attra.org

The Good Grazer Group (GGG) is a network of livestock producers mainly from northwest Arkansas but includes producers from many other states including Virginia, Missouri, and Oklahoma to name a few. GGG maintains a electronic mailing list on which members routinely share information and opinions regarding various topics on forage management and livestock production. Members meet monthly, most times at a

member's farm, to see and discuss information related to grazing practices. Individuals interested in joining the GGG should contact Ann Wells at annw@ncatark.uark.edu.

Information regarding the ***Arkansas Cooperative Extension Service and the Division of Agriculture*** can be found on the internet at the following web site: www.uaex.edu.

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Attention

Are you interested in a person to speak at a meeting of your civic or agricultural group? If so, please contact David Brauer at 501-675-3834 to see if we can match your interests/needs to the expertise of the Center's staff.

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If you did not receive this newsletter by mail and would like to do so, please contact the Center and we will place you on our mailing list.

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Logan County Cooperative Extension Holds a Cattle Working Program at Center

On February 24, 2001, 40 to 45 people attended a program on cattle working facility program. Information regarding cattle psychology and how that affects working facility design was presented by Larry Campbell, Logan County Extension Agent. Following lunch, staff from the Center lead a tour and demonstrated the Center's new cattle working facility.

Those attending the program were able to see how the points that Larry made in his program were incorporated into actual design and use of a facility. Over the past three (3) years, the Center has designed and built three (3) new facilities to work cattle. If you or your group are interested in a tour, please contact David Brauer or Wes Jackson at 501-675-3834.

*

Conscience is the inner voice which warns us somebody may be looking.

H.L. Mencken

Upcoming Events

June 2, 2001- The Dale Bumpers Small Farms Research Center Field Day. Research, demonstrations and extension activities of ARS, NRCS and AR Cooperative extension will be featured. Tentative agenda:

Registration; Displays Available for Review . . . 08:30
 Brief Remarks and Introductions 09:30
 Tour 09:45
 Research sites demonstrating current research efforts in forages, cattle, and sheep production, conservation practices, soil management, and agroforestry.
 Lunch at Station 11:45
 Guest Speaker Representative Asa Hutchinson (R) Arkansas 4th Congressional District
 Displays Available for Review 01:00
 Center Staff Available for Questions and Answers

August 25, 2001- The Dale Bumpers Small Farms Research Center Sheep Day. Extension activities, ram breeding soundness will be provided.

Registration 8:30
 Welcome, Dr. David Brauer, DBSFRC 8:45
 Tour of the Facility 9:00
 Predator Control, Guy Robson, DBSFRC 10:00
 Ram Breeding Soundness 10:30
 Future Direction of the Sheep Industry 11:00
 Dr. Charles Parker
 Scrapie and other Health Issues 11:45
 Dr. Dianne Hellwig, Univ. of Arkansas
 Lunch 12:15
 Hair Sheep Research 01:00
 at ARS in Booneville, Dr. Joan Burke, DBSFRC
 Marketing of Lamb 01:30
 Jim Morgan, Round Mountain Katahdins, Fayetteville
 Other potential topics:
 Management of a Profitable Sheep Flock
 Feeding the Flock
 Value Added Products
 Katahdin meeting 3:00

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